

1,2-EPOXYBUTANE

1,2-Epoxybutane is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 106-88-7

Molecular Formula: C₄H₈O



1,2-Epoxybutane is a colorless liquid which is soluble in water, acetone, benzene, and alcohol, and miscible with most organic solvents. It has a disagreeable odor. The liquid is lighter than water and the vapor is heavier than air (HSDB, 1991).

Physical Properties of 1,2-Epoxybutane

Synonyms: 1,2-butylene oxide; 1,2-butene oxide; propyl oxirane

Molecular Weight:	72.12
Boiling Point:	63 °C
Vapor Density:	2.49 (air = 1)
Density/Specific Gravity:	0.837 at 17/4 °C (water = 1)
Flash Point	5 °F
Conversion Factor:	2.94 mg/m ³ at 25 °C

(HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Fugitive emissions from the production of 1,2-epoxybutane are a major source. 1,2-Epoxybutane is used as a stabilizer in chlorinated solvents for metal cleaning and degreasing. It is also used in the production of butanediols, glycol esters and ethers, in the preparation of surface active agents and gasoline additives, as an intermediate, and as an acid scavenger for chlorinated compounds (HSDB, 1991). 1,2-Epoxybutane is produced in California (SRI, 1993).

The primary stationary sources that have reported emissions of 1,2-epoxybutane in California are manufacturers of miscellaneous primary metal products, manufacturers of miscellaneous plastic products, and home furnishing stores (ARB, 1997b).

B. Emissions

The total emissions of 1,2-epoxybutane from stationary sources in California are estimated to be at least 6,100 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

No information about the natural occurrence of 1,2-epoxybutane was found in the readily-available literature.

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of 1,2-epoxybutane.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of 1,2-epoxybutane was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

1,2-Epoxybutane is expected to exist almost entirely in the vapor phase in the ambient atmosphere due to its relatively high vapor pressure. The dominant atmospheric loss process for 1,2-epoxybutane is expected to be the gas phase reaction with the hydroxyl (OH) radical. Based on this reaction, the atmospheric half-life and lifetime of 1,2-epoxybutane is estimated to be 5 days and 7 days, respectively (Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Although 1,2-epoxybutane is reported as being emitted in California from stationary sources, no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to 1,2-epoxybutane are inhalation and dermal contact (HSDB, 1991).

Non-Cancer: 1,2-Epoxybutane is an eye and respiratory tract irritant. Chronic long-term

exposure in rats and mice have caused degenerative lesions of the nasal cavity. Animals exposed chronically to high concentrations of 1,2-epoxybutane have developed adverse effects of the spleen, thymus, kidneys and blood (U.S. EPA, 1994a).

The United States Environmental Protection Agency (U.S. EPA) has established a Reference Concentration (RfC) for 1,2-epoxybutane of 0.02 milligrams per cubic meter based on degenerative lesions of the nasal cavity in mice. The U.S. EPA estimates that inhalation of this concentration or less, over a lifetime, would not likely result in the occurrence of chronic non-cancer effects. The U.S. EPA has not established an oral Reference Dose (RfD) for 1,2-epoxybutane (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of 1,2-epoxybutane in humans. In one developmental inhalation study on rabbits the pregnancy rate was reduced, accompanied by high maternal mortality. No adverse reproductive function effects were observed in an inhalation study in rats (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of 1,2-epoxybutane in humans. In an inhalation study of 1,2-epoxybutane in rats and mice, tumors of the nasal cavity and alveolar/bronchial tumors were produced in male rats, but were not observed in mice. The U.S. EPA has not classified 1,2-epoxybutane for potential carcinogenicity (U.S. EPA, 1994a). The International Agency for Research on Cancer has classified 1,2-epoxybutane in Group 3: Not classifiable (IARC, 1987a).

